

Forest Pest Management

Pacific Southwest Region



Lat 40.32939 Lon -121.27471

September 10, 1998

File Code: 3420

Subject: White fir mortality in the Benner Management Area (Report #NE98-6)

To: District Ranger, Almanor RD, Lassen National Forest

At the request of Judy Welles, Prep Forester, I visited several areas in the Benner Management area, Almanor RD, on August 26, 1998. District personnel had observed some signs and symptoms of insect attacks on white fir and some recent top kill. The objective of the field visit was to examine some the trees to confirm bark beetle activity, identify the bark beetles involved and to discuss what influence the attacks may have on tree survival. I was accompanied in the field by Dominic Cesmat, Prep Forester, the small sales/ salvage crew and Engine 12. The small sales/salvage included Ernie Ramirez, John Andrews, and Theresa Voboril. The people on Engine 12 included Jim Burton, Carla Kellum and Matt Sauer. The engine crew was along to drop trees, as we requested, for dissection. The areas we examined were along FS Road 29N38 (T 29N R 6E Sec. 15 & 22).

OBSERVATIONS

Background Information

The Lassen National Forest experienced above normal levels of white fir mortality in the early 1990's. Most of the mortality was on the east side and transition zones of the Forest, at lower elevation and drier sites, in response to the protracted drought period which began in 1987. Factors involved with the high levels of mortality included overstocking, an increase in shade tolerant white fir, the fir engraver beetle and the extended below normal precipitation period. Over the past 3 years the level of white fir mortality on the Forest has decreased due to an increase in precipitation and reduced competition among the remaining live residual trees.

Similar to other stands of white fir on the Forest, the areas we examined experienced above normal levels of white fir mortality during the drought. Salvage sales were conducted in these stands in the early 1990's.

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Current Condition

The stands we observed were mixed conifer dominated by white fir. Other species included incense cedar, ponderosa and Jeffrey pine and a minor component of lodgepole pine. Current basal areas range from about 250 to 350 sq. ft./acre. The site index for individual stands ranges from about a III to a V. Precipitation is approximately 40 inches per year and the elevation is 5000 ft.

Based on the characteristics (needle retention and color, bark sloughing, etc.) of the majority of trees most mortality occurred 3 or more years ago. Although some older top kill and scattered branch flagging was observed it appeared as though the result of the drought and fir engraver beetle attacks was primarily whole tree mortality. At the time of the field visit there was minimal new mortality observed.

We did observe several trees with poor crowns that had white frass around the lower boles. These trees were infested with roundheaded fir borers. Dissections of felled trees confirmed the presence of older fir engraver attacks along the mid to upper boles and roundheaded fir borer larvae infesting the lower boles. In addition, trees which had been top-kill by fir engraver over the past few years are also infested with roundheaded fir borers in the lower boles. Only one of the felled trees had current fir engraver activity.

DISCUSSION

Throughout most of the Sierra Nevada the level of white fir mortality has returned to background levels responding to 3 years of normal or above normal precipitation. Some trees, however, are continuing to show signs of stress related to stand conditions. The white fir in the Benner Management area sustained heavy mortality during the drought. Several of the trees sustained heavy fir engraver attacks that did not result in whole tree mortality. These trees now have various levels of older top kill, scattered branch mortality and overall poor crown health. The roundheaded fir borer, Tetropium abietis, that is currently working in the lower boles of these trees typically only make successful attacks in severely stressed or low vigor trees. It is likely, had the drought continued for another year, the fir engraver beetle would have killed these trees. The onset of a moist precipitation regime has allowed these trees to survive for a few more years.

A sudden increase in mortality in the area this year is not likely. The borers will continue to work in trees that have low vigor and those trees will die over the next few years. Mortality should remain relatively low until the next drought period, however silvicultural manipulation of the stocking levels can make the residual vegetation more resistant to fir engraver and roundheaded fir borer attacks in the future. Typically, an increase in growth and vigor is not reflected until a year or two following thinning. Proactive management during normal precipitation periods is highly recommended as opposed to waiting until the middle of drought period when stands are experiencing high levels of mortality. At that point thinning has little short term effect and the harvesting activity in the stands places additional stress on the trees. Observations of past fir mortality in a number of locations, and the results of thinning studies in other species suggest that a stocking level that would result in no mortality under drought

conditions would be too low to fully utilize the site under normal conditions and would likely not be in line with current management objectives.

Where it is feasible to do thinning, future mortality would be reduced by retaining the dominants and co-dominants while reducing stocking to about 80% of normal. Since current mortality is minimal throughout the area I would recommend the use of a desired residual basal area or stand density index achieved through thinning rather than attempting to predict individual white fir tree mortality based on external characteristics. If the residual stand is composed of the desired basal area represented by the healthiest, best-formed trees in the population with residual selection based on crown canopy, the absence of significant tree damage, and a preference toward drought tolerant species, the susceptibility to bark and engraver beetle attacks in the future will be reduced significantly. Many of the trees with top kill and/or scattered branch flagging (typical characteristics in salvage marking guidelines for true fir) would be removed because they would not meet the selection criteria above.

MANAGEMENT OBJECTIVES

1. No Action. Trees with poor crowns, low vigor and borer activity will die in the next 1-2 years. Fir mortality will likely remain at low levels until the next drought period. Stocking levels will continue to increase over time and an above normal amount of fir engraver-related mortality should be expected during the next drought.

2. Salvage Dead and Dying Trees. Salvaging dead trees does not influence the bark and engraver beetle populations or future bark beetle-related mortality. Salvage logging would remove some of the wood while it still has commercial value and also reduce the amount of standing and down fuels. Determining dying trees would be very labor intensive and we have had relatively minimal success in attempting to predict true fir mortality until it becomes rather obvious.

3. Thin Stands. Depending upon management objectives, some silviculture treatments can enhance or help maintain the coniferous component in the area. Silvicultural treatments can make the stand's growing space available to desirable species and/or put individual trees in a competitively advantageous position. Thinning stands to a lower basal area while favoring drought tolerant species and promoting species diversity should limit the amount of future fir engraver beetle-related mortality to acceptable levels.

If you have any questions regarding this evaluation or request additional assistance please contact me at 916-252-6667.



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